REPORT OF SURVEY CONDUCTED AT

WILTON ARMETALE
MOUNT JOY, PA

JANUARY 1999

Best Manufacturing Practices

1998 Award Winner

INNOVATIONS IN AMERICAN GOVERNMENT

BEST MANUFACTURING PRACTICES CENTER OF EXCELLENCE
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Foreword

This report was produced by the Office of Naval Research's Best Manufacturing Practices (BMP) program, a unique industry and government cooperative technology transfer effort that improves the competitiveness of America's industrial base both here and abroad. Our main goal at BMP is to increase the quality, reliability, and maintainability of goods produced by American firms. The primary objective toward this goal is simple: to identify best practices, document them, and then encourage industry and government to share information about them.

The BMP program set out in 1985 to help businesses by identifying, researching, and promoting exceptional manufacturing practices, methods, and procedures in design, test, production, facilities, logistics, and management – all areas which are highlighted in the Department of Defense's 4245.7-M, *Transition from Development to Production* manual. By fostering the sharing of information across industry lines, BMP has become a resource in helping companies identify their weak areas and examine how other companies have improved similar situations. This sharing of ideas allows companies to learn from others' attempts and to avoid costly and time-consuming duplication.

BMP identifies and documents best practices by conducting in-depth, voluntary surveys such as this one at Wilton Armetale, Mount Joy, Pennsylvania conducted during the week of January 11, 1999. Teams of BMP experts work hand-in-hand on-site with the company to examine existing practices, uncover best practices, and identify areas for even better practices.

The final survey report, which details the findings, is distributed electronically and in hard copy to thousands of representatives from industry, government, and academia throughout the U.S. and Canada – *so the knowledge can be shared.* BMP also distributes this information through several interactive services which include CD-ROMs, BMPnet, and a World Wide Web Home Page located on the Internet at http://www.bmpcoe.org. The actual exchange of detailed data is between companies at their discretion.

Wilton Armetale employs a progressive management style and a continuous improvement program to resolve challenges and stay competitive. The result is a proactive empowered culture characterized by customer focus, active employee involvement, and attention to detail. Among the best examples were Wilton Armetale's accomplishments in management atmosphere; environmental program; marketing team; and customer orders and service.

The Best Manufacturing Practices program is committed to strengthening the U.S. industrial base. Survey findings in reports such as this one on Wilton Armetale expand BMP's contribution toward its goal of a stronger, more competitive, globally-minded, and environmentally-conscious American industrial program.

I encourage your participation and use of this unique resource.

Ernie Renner
Director, Best Manufacturing Practices

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Section 1

Report Summary

Background

The Wilton family has been involved in the metal casting industry since 1892 when Ralph P. Wilton, Sr. began working for his uncle at the Susquehanna Casting Company near Wrightsville, Pennsylvania. At that time, the foundry produced industrial iron castings for other manufacturers. Half a century later, Ralph P. Wilton, Jr. expanded the family business through other ventures, such as Wilton Products (1940) which made cast iron gifts and the Wilton Brass Company (1955) which initially produced industrial brass, aluminum, and iron castings. The company's greatest success occurred in 1963 when Wilton, Jr. developed the formula for a unique aluminum-based alloy called Armetale®, which led to a new line of Wilton products. In 1969, the Wilton Brass Company relocated to Mount Joy, Pennsylvania and changed its name to reflect its new direction. Today, Wilton Armetale combines innovative design with old-world craftsmanship to produce a successful line of serveware, giftware, and decorative accessories.

Wilton Armetale's products are produced by using an ancient painstaking process called sand molding, whereby an impression formed in sand is filled with molten metal. Since items are individually cast and meticulously hand-finished, no two pieces are exactly alike. Not surprisingly, the Armetale® formula remains a closely guarded family secret. When cast, this metal alloy can be worked to acquire the look of pewter or be highly polished to resemble silver. Products made from Armetale® are functional as well as beautiful. The tarnish-resistant alloy will not crack, chip, or dent; and its ability to retain temperatures makes it versatile for heating, chilling, and serving. Design is an important element of Wilton Armetale's products, so it is fitting that the name Armetale means *art metal*.

Currently run by third- and fourth-generation Wiltons, the company employs 200 personnel. Wilton Armetale promotes a strong team-oriented atmosphere, advocates community involvement, and personalizes its customer service. The company also strives for environmental excellence. In 1997, Wilton Armetale achieved ISO-14001 certification, and became the first foundry to conform to this international standard. As a result of its efforts, the company received the Pennsylvania Governor's Award for Environmental Excellence in 1996 and 1998. The company's proactive approach promotes communication, innovation, and leadership. Among the best practices documented were Wilton Armetale's management atmosphere; environmental program; marketing team; and customer orders and service.

Keeping up with design trends/marketing and developing products for functional/decorative use remain Wilton Armetale's top priorities. Internally, the company employs a progressive management style and a continuous improvement program to resolve challenges and stay competitive. The result is a proactive empowered culture characterized by customer focus, active employee involvement, and attention to detail. The Wilton Armetale products, themselves, represent the company's commitment to excellence with their style, romance, and beauty. The BMP survey team considers the following practices to be among the best in industry and government.

Best Practices

The following best practices were documented at Wilton Armetale:

Item	Page
Environmental Program	5

In 1994, Wilton Armetale undertook a conscious effort to maintain environmental compliance by initiating the Green Plan. After one year, the company reduced solid waste costs by 24%; solid waste volume by 20%; and landfill material amounts by 20%. Today, the company exceeds environmental compliance, has become an industry leader, and is the only foundry in the United States to achieve ISO-14001 conformance.

Item	Page
Production Planning	5

Wilton Armetale set up Production Planning meetings as a way of improving the interaction and communication among its Manufacturing, Operations, Inventory Control, Distribution, Marketing, and Finance Teams. Representatives from each team meet on a monthly basis to be actively involved in the planning process. They share and analyze information, review progress, and address areas of waste.

Item	Page	Item	Page

Molding Process Development/ Improvement

Since 1892, Wilton Armetale had primarily used a manual molding process for its metal castings because of the artistic nature of its products. However in 1998, the company recognized the need to automate this process due to the continued growth of its market and the necessity to increase molding capacity. As a result, Wilton Armetale is meeting its production needs without outsourcing and achieved a 17.7% increase in revenue over the previous year.

Communications

Effective communication is a key aspect of a successful organization. Wilton Armetale places great importance on keeping its employees and customers well informed. Prior to 1994, the company had few communication tools in place which could provide consistent, reliable information throughout the plant. Today, Wilton Armetale uses various communication methods such as company newsletters, meetings, and surveys.

Customer Orders and Service

In an extended effort to best serve its customers, Wilton Armetale cross-trained and combined the Order Entry Department with the Customer Service Department. Customer orders receive attention to detail and are processed via computer in the most expeditious way possible. Customer service features a personal touch which has become quite popular with clients.

Electronic Data Interchange

Electronic Data Interchange is a method that enables Wilton Armetale to electronically receive orders from its customers. This approach enabled the company to reduce manual inputs, decrease processing costs, and eliminate handling and mailing costs. Today, 75% of all orders are handled through this method.

Management Atmosphere

Wilton Armetale adopted a team-based approach intended to get everyone in the company involved and to embrace the principles of continuous improvement. Key factors in the success of this approach are communication and openness regarding all aspects of the business including financial data and results. In addition, management focused on breaking down barriers; informing and empowering the workforce; and providing teams with the support and resources needed to make continuous improvements.

Marketing Team

In Spring 1996, Wilton Armetale developed the Marketing Team as part of corporate restructuring and the company's evolution toward teaming and continuous improvement. The team's purpose was to bring together everyone in the company who was involved in managing any aspect of marketing. This approach creates a uniform and synchronized approach to marketing Wilton Armetale's products.

Organizing for Continuous Improvement

Wilton Armetale wanted to retain the atmosphere of a small, family-owned company with a strong entrepreneurial spirit that was responsive to its customers and promoted leadership. To achieve this goal, the company adopted a horizontal organizational structure and embraced a team-based continuous improvement approach. The company's success was accomplished through extensive training as well as strong commitment and leadership from its owners and top management.

Information

The following information items were documented at Wilton Armetale:

Product Development

In 1892, Wilton Armetale's primary products were manufactured in cast iron and sold to other manufacturers for industrial use. Over the years, the products and materials produced by the company have changed, but the product development still remains a hands-on manual process that combines the skills of a designer with those of a master model builder.

Emery Process Development/ Improvement

Prior to 1998, Wilton Armetale had always recognized that the emery process was limiting its ability to increase the throughput of its products. Working with its suppliers and internal customers, Wilton Armetale began investigating alternatives that could replace or diminish the need for this process. By modifying its vibratory and automatic buffing processes, the company resolved the emery process issue for 14% of its products.

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Manufacturing Process Controls

In 1996, Wilton Armetale entered into a Quality Assurance program sponsored by the Non-Ferrous Founders Society. At that time, the company wanted to increase the consistency of its in-house process controls and become an ISO-certified supplier. Since implementing the program, Wilton Armetale passed a third-party certification audit in December 1998 which resulted in ISO-9002 certification.

Training Program   14

In 1998, Wilton Armetale changed to a more structured and disciplined training approach when it started a Job Consortium with four local companies. This consortium is partnered with the Lancaster County Career and Tech Center, and receives funding through the State of Pennsylvania for training costs if certain requirements are met.

Business Strategic Planning   14

In 1999, Wilton Armetale simplified its Business Strategic Planning process so that it would be manageable and produce meaningful results. The Board Executive Committee identifies a few simple and clear-cut objectives to address, and the Operations Team develops a plan to meet those objectives. The objectives for 1999 are to increase sales by 10% and improve pre-tax profit on sales by 8%.

Community Involvement   15

Wilton Armetale is an active participant in the Mount Joy community and always lends support when possible. The president approves all community involvement projects based on their beneficial impact to the community, the employees, and the company.

Ideas Suggestion Program   15

In 1994, Wilton Armetale set up the Ideas Suggestion program as part of its continuous improvement efforts. The program's purpose is to encourage employees to develop and implement ideas for improvement.

Safety Team   15

In 1994, Wilton Armetale created a Safety Team to oversee all aspects of safety and health within the company. The Safety Team is responsible for completing accident reports and accident investigation; identifying and correcting potential or existing hazards; maintaining safety records; providing Occupational Safety and Health Administration training; coordinating annual hearing testing; increasing the level of safety awareness; and ensuring an ethical and legal standard of safe operation.

Point of Contact

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Section 2

Best Practices

Production

Environmental Program

In 1994, Wilton Armetale undertook a conscious effort to maintain environmental compliance by initiating an Environmental Management System known as the Green Plan. Employees were educated on environmental management and its role in the company. Waste source reduction, pollution prevention, and recycling were also incorporated into the system. The company reviewed all environmental reporting methods and determined that one of its previously submitted reports was no longer required.

After the first year of implementing the Green Plan, Wilton Armetale reduced solid waste costs by 24%; solid waste volume by 20%; and landfill material amounts by 20%. Based on this initial success, the company expanded its educational efforts to include participation by the surrounding community. Over the years, the Green Plan continues to decrease Wilton Armetale's costs and volume. Based on 1994 figures, solid waste costs dropped by 35% in 1996 and 55% in 1997; and solid waste volume decreased by 35% in 1996 and 44% in 1997. The company also identified a waste hauler which helped decrease waste costs by 31% between 1996 and 1997. Production rates at Wilton Armetale have increased every year between 1994 and 1998, while waste volume taken to landfills has leveled out. These waste savings are even more substantial when one considers the increase in production volume.

Although at one time Wilton Armetale was one of the worst environmental polluters in Pennsylvania, the company now exceeds environmental compliance. In 1997, Wilton Armetale achieved ISO-14001 certification, and became the first foundry to conform to this international standard. As an industry leader and a model company in Pennsylvania, Wilton Armetale also received the Pennsylvania Governor's Award for Environmental Excellence in 1996 and 1998.

In addition to the cost savings, the Green Plan helped Wilton Armetale do fewer inspections and established a proactive relationship with regulators and legislators. This approach has led to the company being invited to attend regional/national conferences sponsored by regulatory agencies for the purpose of sharing its story and successes. In addition, the state agency uses Wilton Armetale as an example from which others can learn, and the Environmental Protection Agency is working with the company as part of the agency's Sustainable Manufacturing Practices program.

Production Planning

An offshoot of Wilton Armetale's Continuous Improvement program involves Production Planning. The company recognized the need to improve interaction and communication among its Manufacturing, Operations, Inventory Control, Distribution, Marketing, and Finance Teams. To address these issues, the teams set up Production Planning meetings. Representatives from each team meet on a monthly basis to be actively involved in the planning process. They share and analyze information, review progress, and address areas of waste. In addition, a weekly meeting is held to improve communication among the teams. By using both activities, the teams become aware of one another's role and can work toward common goals.

The monthly Production Planning meeting is a two-hour event. Here, the representatives discuss the previous month's sales, production, and shipping; the present month's production; and the next three months' sales and production needs. Each attendee is expected to bring information to support the results of the previous month's activity, and share information which will assist the group with its planning and scheduling decisions for the next few months. The weekly meeting is a brief, 15-minute review that notes the previous week's activities, problems and possible solutions, and plans for the present week. Representatives from the Manufacturing, Distribution, Marketing, and Operations teams attend this meeting.

Since implementing the Production Planning meetings, Wilton Armetale increased communication, brought early visibility to problems, and helped improve production and on-time deliveries. Additional improvements include:

- Customer service levels increased by 63.1% between 1995 and 1998.

- Lost sales due to product unavailability (as a percentage of sales) improved by 79.2% between 1997 and 1998.

- Transaction time needed to pick and pack an order decreased 211% between 1995 and 1998.
- Distribution expenses decreased 13.6% between 1997 and 1998.
- The dollar value of shipments increased by 10.5% with 1.42 fewer people between 1997 and 1998.

Facilities

Molding Process Development/Improvement

Since 1892, Wilton Armetale had primarily used a manual molding process for its metal castings because of the artistic nature of its products. However, in 1997, the company recognized the need to modify this process due to the continued growth of its market and the necessity to increase molding capacity. At the time, the company used 20 employees to operate ten manual molding lines. A shortage of skilled labor compelled Wilton Armetale to outsource the molding process to increase molding capacity. This solution proved to be unacceptable because of high scrap rates and poor customer service.

An analysis of the situation indicated that the molding process needed to be automated so the company could keep up with demands. After researching various automated systems, Wilton Armetale placed an order in late 1997 with Roberts Sinto for an automatic molding machine, handling system, and two small holding furnaces. The equipment was received and installed in June 1998. Once the equipment became operational, the company determined that its ten manual lines could be reduced to five with no loss of productivity. This action reduced the molding line operators from 20 to ten, and enabled the company to reassign ten employees to other tasks at the plant.

Since implementing the automatic molding equipment, Wilton Armetale is meeting its production needs without outsourcing and achieved a 17.7% increase in revenue over the previous year. Scrap rates also dropped by 3.5% during the first six months of operation by using the automatic molding equipment. The company determined that the return on investment will be realized in less than two years. Not only have these improvements increased Wilton Armetale's molding capacity to match its growth, but the company now has an effective, consistent process that is less dependent on operator skill.

Management

Communications

Effective communication is a key aspect of a successful organization. Wilton Armetale places great importance on keeping its employees and customers well informed. Prior to 1994, the company had few communication tools in place which could provide consistent, reliable information throughout the plant. Today, Wilton Armetale uses various communication methods such as company newsletters, meetings, and surveys.

The company newsletter was one communication tool which Wilton Armetale had used in the past. However, this approach almost ceased to exist because the burden was placed on a single employee who eventually retired. The process involved one individual generating all the stories, taking the copy to an off-site printer, and distributing the newsletter four weeks later which provided old news at best. In 1994, the newsletter took on a new resurgence through the team effort of Wilton Armetale employees. At first, articles were handwritten by team members and typed in print by an outside contractor, because not everyone was familiar with computers. Today, all team members are computer literate; therefore articles are submitted on disk, entered into a newsletter program, and formatted to produce the newsletter. Although team members usually gather and write articles, all employees are now invited to submit stories. The process which used to take weeks, now takes four days and at only a fraction of the cost. Wilton Armetale's newsletter provides employees with a variety of information including company operations, team progress, employee achievements, human interest stories, and calendar events. Distribution reaches the entire workforce as well as retirees, customers, and partners.

Wilton Armetale also uses Supervisor Meetings as a communication tool. These monthly meetings assess the overall team process and ensure that all employees embrace the company's Right Way to Work Concept. At the heart of the reviews are the Employee Assessment Survey and the Supervisor and Manager Assessment Survey. The Employee Assessment Survey captures input from the workforce that helps identify areas where the company is doing well and where improvements need to be made. The Supervisor and Manager Survey captures input from management, checks the progress of team concept implementation, and identifies where to apply additional efforts to achieve maximum progress. The

Continuous Improvement Team as well as all the managers attend the Supervisor Meetings. The group reviews the financial, schedule, quality, and training data provided by the teams and departments that support the assessment findings. The information is then communicated to all employees. The Continuous Improvement Team supports the entire process.

Another communication tool is Department Meetings. These meetings are held monthly as a follow up to the Supervisor Meetings. Each supervisor is responsible for passing the information obtained at the Department Meetings to all the employees throughout Wilton Armetale.

These tools significantly help Wilton Armetale achieve its goals of continuously improving its communication process and keeping its employees and customers well informed. Employees, management, and customers give the company high praise for its communication process. Wilton Armetale continues to improve its current practices as well as develop new communication tools for the future.

Customer Orders and Service

In an extended effort to best serve its customers, Wilton Armetale cross-trained and combined the Order Entry Department with the Customer Service Department. Customer orders receive attention to detail and are processed via computer in the most expeditious way possible. Customer service features the personal touch which has become quite popular with clients.

Examples of improvements in processing orders include:

- Order Placement — At one time, pick tickets and packing slips were typed on a manual typewriter and physically carried to the Shipping Department for filling, packing, and shipping. The paperwork was so labor intensive that the Order Entry Department was unable to answer the telephones for more orders. Today, orders are keyed directly into the computer or received via Electronic Data Interchange (EDI). Pick tickets and packing slips are automatically generated and take only a few minutes to print. All picking, packing, and shipping are handled by the Distribution Center.
- Customer Accounts — In the past, customer accounts were not computerized. Information pertaining to accounts was printed on two large lists (A-L and M-Z). Employees manually searched these lists to locate accounts. Changes and additions were hand-written on the lists. New lists were generated every three months which

required two employees a week to double-check all entries for accuracy. Today, all accounts are in a database and easily accessible within seconds. Employees enter all changes directly into the computer, and updates become effective immediately.

- Order Tracking — Previously, the lack of computers required the company to store all records of orders on microfilm. As a result, customers' questions regarding orders could not be answered in a timely manner because the microfilm needed to be called up before the information could be retrieved. This process kept customers waiting for hours to get an answer. Today, all orders can be accessed via computer while the customer is on the telephone. An imaging machine allows employees to retrieve an image of the original order directly at their desk.
- Telephone Orders — Telephone orders were previously handwritten on an order header form; edited; key-punched; taken to a contractor for conversion; and returned to Wilton Armetale. These transactions are now entered into the computer as the customer places the order over the telephone. Pick tickets and packing slips are generated automatically and printed out at the Distribution Center for processing.
- Dedicated Computers — The introduction of computers to the two departments required sharing computers among personnel at a ratio of 2:1. Today, each employee has a computer, allowing customers to be serviced promptly.
- Combining Departments — Today, the Order Entry Department and the Customer Service Department are also combined with the Consumer Direct Division. All personnel are cross-trained to handle all types of calls and order entry functions.
- Product Availability — Previously, if a customer called to check on the availability of an item, employees needed to read a printed Stock Status report to obtain the answer. Today, a computer database provides information on which products are packed and waiting for shipment, and which are in stock for immediate sale.
- EDI — EDI orders are printed every morning and automatically entered into the computer system. This method now accounts for 75% of all orders.

Examples of improvements in customer service include:

- Fast Response — All telephone calls are answered within three rings, and all return calls must be completed within 24 hours. Greater authority is

now given to employees for making decisions (within certain prescribed parameters), thereby providing time savings to customers.

- A Little Extra — The company also provides various niceties to its customers. These include free shipping on the first order of new retail accounts; sending anniversary cards to customers to mark the date their accounts were opened; and maintaining a customer history of transactions and interests.

Since reorganizing the Order Entry and Customer Service Departments, personnel requirements were reduced; order and service capabilities were increased; and overall operational performance and customer satisfaction were significantly improved. Today, the telephones can be answered with a personal touch without falling behind in order entry processing.

Electronic Data Interchange

Electronic Data Interchange (EDI) is a method that enables Wilton Armetale to electronically receive orders from its customers. Prior to 1992, all order entry and invoicing functions were initiated by mail, telephone, or facsimile. The process involved generating a hard copy that was used as the input document for data entry into the computer. Next, a picking list was generated as the turnaround document, which provided input for the computer to invoice the merchandise received by the customer. As sales increased, the company realized that additional personnel were required to process the larger volumes of orders. To remain competitive, Wilton Armetale selected EDI as a way to further its automation of order taking and invoicing.

In 1992, Wilton Armetale first implemented an EDI system with a large chain store customer, and adhered to the retail industry subset commonly known as the Voluntary Inter-industry Communications Standard. Data was retrieved by using a personal computer with a DOS operating system and software from Sterling Commerce. Eventually, the ability to map incoming data was accomplished which enabled the company to perform computer-to-computer transfers for purchase orders. This approach reduced manual inputs and decreased processing costs. By electronically transmitting invoices, the company also eliminated handling and mailing costs.

In 1994, Wilton Armetale handled 18,000 orders via EDI. In 1997, these transactions grew to 40,000. Since implementing EDI, the number of electronic orders increased from 10% in 1982 to 75% in 1998. The company also transmits 852 Production Product

Activity Data documents on a weekly basis. These documents detail sales data from customers by line item, and allow sales and marketing personnel to react quickly to trends. Because of the large volumes of data being processed, the EDI system was upgraded to a Sterling Commerce Gentran Server for the IBM A/S400. By eliminating the personal computer platform and setting up a new server, Wilton Armetale vastly improved its communications and performance. The flexibility of a program scheduler also allowed the company to perform automatic EDI transmissions of user-selected data with many scheduling variables.

Today, Wilton Armetale has 29 EDI customers who make up 75% of the company's orders. Orders are processed within a few hours. Shipping time for EDI customers is three to five working days and all others are within ten days. The company currently transmits three times per day: (1) early morning to receive inbound documents, (2) 4:00 P.M. to transmit advance shipping notices, and (3) 7:00 P.M. to transmit outbound documents. The capability now exists with Sterling Commerce to access Wilton Armetale's mailbox via the Internet at any time to view what data is available to retrieve.

Management Atmosphere

Wilton Armetale has been a family-owned business in the metal casting industry since 1892. Throughout most of its history, the company produced iron castings for other companies on a job-shop basis. In the 1950s, the company opened a brass and aluminum foundry, and diversified into producing castings from copper based and aluminum alloys, but still on a work-for-others basis. In the early 1960s, the company developed its proprietary Armetale® alloy, and began producing and marketing a proprietary line of food service and giftware products. By the early 1970s, Wilton Armetale stopped making products for other companies, and focused exclusively on its own seven product lines. As a result, the company experienced substantial growth in revenues and expanded its product lines to more than 1,000 items.

However by the early 1990s, profits began eroding and growth began declining. It became apparent to the owners that fundamental changes in the structure and operation of the business would be required to revive the company. They realized the need to downsize as well as eliminate or redesign inefficient operations. The first step involved streamlining unnecessary managerial layers such as vice presidents, assistants, and secretaries that had developed in the
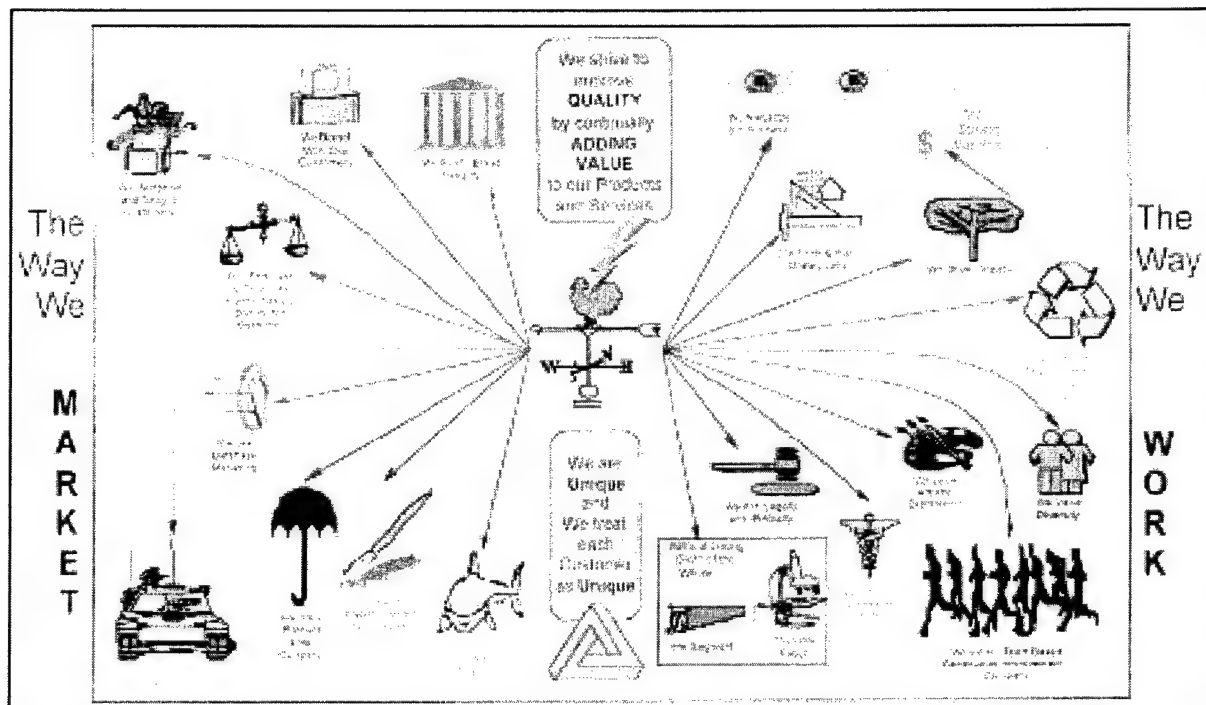
Figure 2-1. The Wilton Armetale Values

past which substantially increased costs with little value added. The owners then set up a horizontal management structure which helped the company become more lean and agile, and brought management personnel much closer to the work and the customers.

The new lean management decided that the next step was to adopt a team-based approach intended to get everyone in the company involved and to embrace the principles of continuous improvement. To help the company do this, Wilton Armetale retained the services of Conway Quality of Nashua, New Hampshire. This firm provided the training and assistance to help Wilton Armetale understand and adopt continuous improvement concepts, and to train the entire company in a new way of working. The owners and top management made a strong commitment to change, and began channeling a significant amount of resources into training. The company adopted a formal mission to be the highest quality, lowest cost supplier for its type of product in the world. Wilton Armetale's vision statement is simply *to contribute to the beauty of our community*. These principles are guided by the Wilton Armetale Values (Figure 2-1) which have been instilled in all employees.

Teams and getting people involved are now a major thrust of the way Wilton Armetale does business. As the team concept developed and people became more empowered, the company focused on finding and

eliminating waste throughout the foundry. Significant savings and improvements began emerging in a relatively short period of time. This task was, and continues to be, a difficult and challenging process but one which has been embraced by the employees and to which the company is committed.

Key factors in the success of this approach are communication and openness regarding all aspects of the business including financial data and results. In addition, management focused on breaking down barriers; informing and empowering the workforce; and providing teams with the support and resources needed to make continuous improvements. As a result, Wilton Armetale completely reversed its negative growth from the early 1990s. In the past few years, the company has achieved and maintains strong growth with sales increases of 15% in each of the last two years. The company is also attaining high levels of customer satisfaction and is expanding its product line into new sectors and markets.
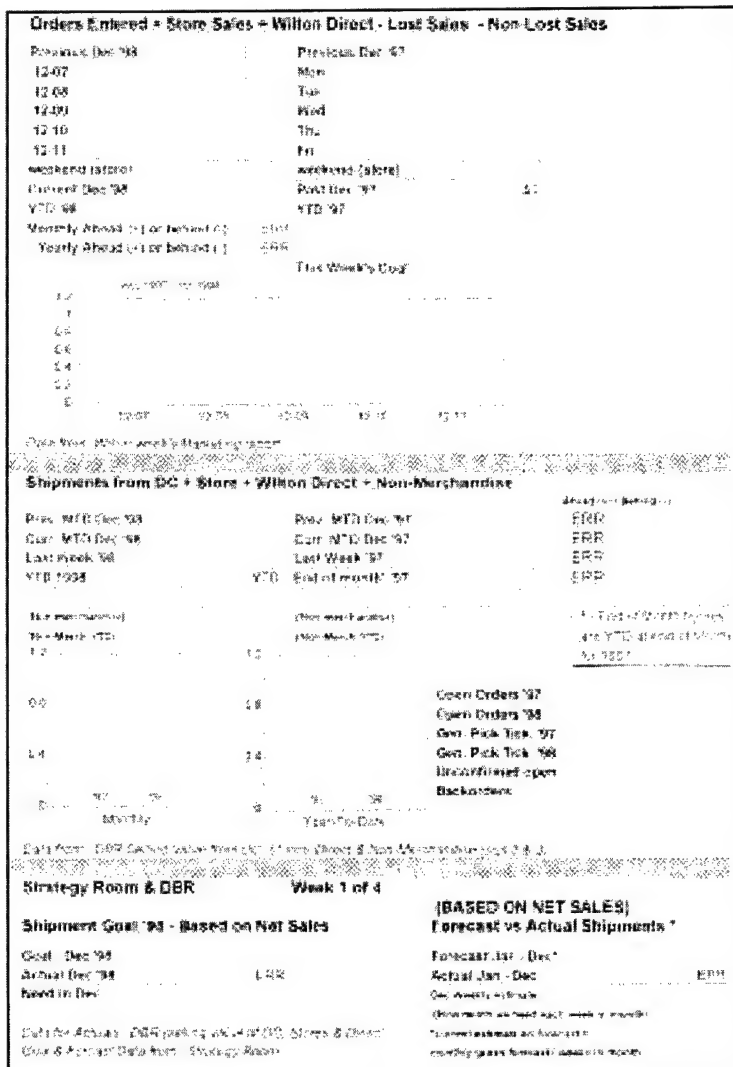
Marketing Team

In Spring 1996, Wilton Armetale developed the Marketing Team as part of corporate restructuring and the company's evolution toward teaming and continuous improvement. The team's purpose was to bring together everyone in the company who was

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involved in managing any aspect of marketing. This approach creates a uniform and synchronized approach to marketing Wilton Armetale's products. Team members include representatives from the Executive Committee, Sales, Marketing, Customer Service, Manufacturing, Sales Promotion, and New Products.

The Marketing Team is the largest group in the company because it involves many disciplines and areas. Team members fall into two categories: advocates and support personnel. Advocates are employees who are in direct contact with customers (e.g., small, medium, and large retailers; custom and premium customers; bridal; export and food services). Support personnel manage the internal functions that support and facilitate the efforts of the advocates. These functions include manufacturing; customer service; Internet and direct marketing; scheduling; product management; and advertising. The president (an owner) is also a member of the Marketing Team, and two members of the support personnel are also owners and members of the Board of Directors. With three owners on the Marketing Team, the group's work gets high visibility by top management.

Before the Marketing Team was established, the various advocate and support functions were isolated and fragmented with poor communication, leading to disconnects that produced customer dissatisfaction, inefficiencies, and added costs. Sales personnel frequently negotiated discounts with customers, but failed to inform the billing department before the invoices were issued. The basic problem was a lack of effective and timely communication.

The Marketing Team meets once a week to exchange ideas and information, and all members are made aware of the total effect on each area of the company. The team reviews the numbers for the previous week's performance plus key metrics and indicators. These metrics include the previous week's and year-to-date incoming orders, shipments, open orders, and generated pick tickets. The Marketing Team also reviews actual performance as compared to forecast. Figure 2-2 shows the standardized information sheet used to compare forecasts to actual performance. Other items for discussion include customer

Figure 2-2. Weekly Marketing Summary Sample

feedback, ideas for new sales strategies, and general marketing tactics. The team establishes promotional plans; customer and sales representative mailings; marketing strategies; ideas for new products; and any other information that pertains to the smooth marketing of the company's products.

EDI capability provides up-to-date information for a number of Wilton Armetale's largest customers. The Marketing Team uses this tool each week to project and anticipate the needs of these key customers. This information and capability allow the company to be in sync with the rapidly changing demands and needs of its customers, and to accurately forecast their requirements.

The Marketing Team enables effective communication between key sectors of the business for efficient and

effective operations, and rapid response to customer and market demands. The team has been largely responsible for the increase in sales in 1997 of 11.4% and in 1998 of 15.1%, which exceeded the 1998 forecast by nearly 2%. Another result of this team's efforts is that all segments of the company are better informed about Wilton Armetale's marketing programs.

Organizing for Continuous Improvement

Wilton Armetale wanted to retain the atmosphere of a small, family-owned company with a strong entrepreneurial spirit that was responsive to its customers and promoted leadership. To achieve this goal, the company adopted a horizontal organizational structure and embraced a team-based continuous improvement approach. The company's success was accomplished through extensive training as well as strong commitment and leadership from its owners and top management.

Over the past five years, the horizontal organizational structure has evolved into seven components: Board of Directors, Board Executive Committee, Operations Team, Manufacturing Team, Finance Team, Inventory Management Team, and Marketing Team. These groups are interconnected and overlap. The Board of Directors consists of five members who are responsible for meeting long-term objectives of the shareholders. The Board Executive Committee identifies long-term objectives and communicates them to the management of the company. Members of this committee also serve on the management teams. The Operations Team is made up of key management personnel from key disciplines, who also serve as team leaders or members of other teams. This team also reports to the Board Executive Committee through its leader, who is a
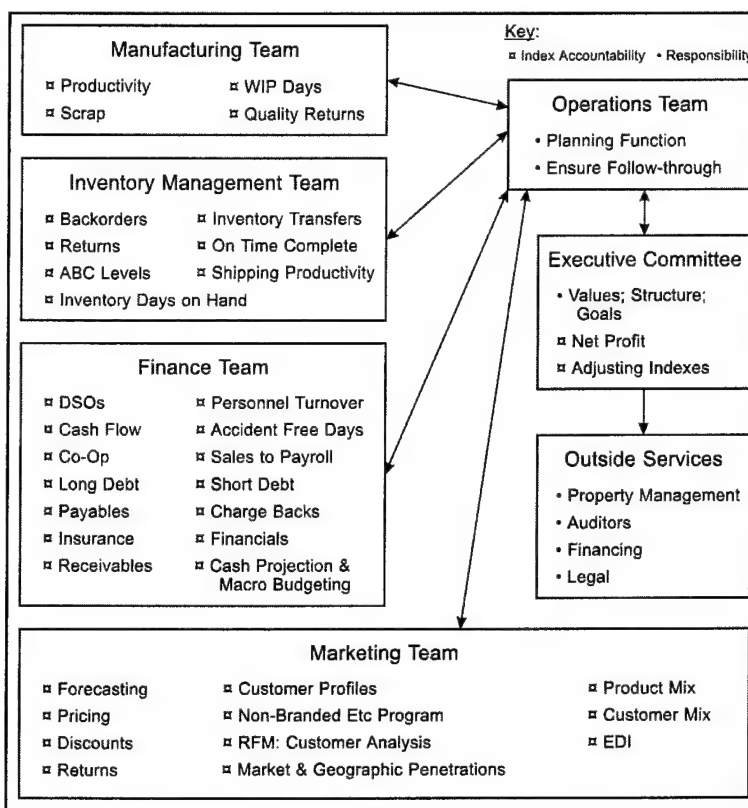
Figure 2-3.   Team Responsibilities and Indexes

member of both board groups. The Manufacturing, Finance, Inventory Management, and Marketing Teams report to the Operations Team through their respective leaders who, in turn, are also members of the Operations Team. Figure 2-3 illustrates the make-up and relationships of the management teams, and also depicts the key metrics and indexes that each team is responsible for managing and tracking.

The horizontal organizational structure helps Wilton Armetale create a managerial atmosphere that is innovative, entrepreneurial, and in tune with customers and employees. This approach also enables the company to be very responsive to change and to set new standards of excellence in its industry.

Section 3

Information

Design

Product Development

In 1892, Wilton Armetale's primary products were manufactured in cast iron and sold to other manufacturers for industrial use. Over the years, the products and materials produced by the company have changed, but the product development still remains a hands-on manual process that combines the skills of a designer with those of a master model builder.

Starting with a conceptual drawing from the designer, the model builder produces a plaster model of the product. A plaster mold is then formed from this model. Next, liquid plastic is poured into the mold to form a plastic model which is used to create the sand molds for the initial rough castings. The castings are then used by the model builder to experiment with different finishes (e.g., matte, highly polished) and to determine what changes, if any, are required before the item is put into production. Once the proper finish is determined and the designer and Director of new products approve the product, the completed plastic model is used to create a metal matchplate. The matchplate then becomes the master for producing the final product.

Sand molding enables Wilton Armetale to manufacture unique product lines with intricate shapes and designs. Although this design method is primarily manual and relies on the builder's skills, the company can introduce a new product in about one week at a cost of $2,000 per item. Wilton Armetale has determined that handcrafted molds and models are still the most cost-effective method for creating its products.

Production

Emery Process Development/ Improvement

Prior to 1998, Wilton Armetale had always recognized that the emery process was limiting its ability to increase the throughput of its products. This manual process is extremely labor intensive, dirty, and dangerous as well as requires skills that are not readily available in the labor pool due to the area's low unemployment rate. To help reduce this problem, the company searched for a solution that would replace or diminish the need for the emery process on as many products as possible. Working with its suppliers and internal customers, Wilton Armetale began investigating alternatives that could achieve this solution.

One area examined was the vibratory process which occurs prior to the emery process. After experimenting with several types of media for this process, the company discovered one that removed metal from casting surfaces at a faster rate and helped eliminate some of the surface imperfections before the pieces reached the emery process. Another area investigated was the automatic buffing process which occurs after the emery process. By trying different types of buffing wheels and setups on the buffing machines, Wilton Armetale determined that the emery process could be reduced or eliminated on certain products. To date, the emphasis in automatic buffing has been on round-shaped products which make up 40% of the items produced by the company.

By the end of 1998, Wilton Armetale reduced or eliminated the emery process on approximately 14% of the total units transferred from manufacturing. The emery time cost that would have been spent on those products was reduced by $3,000. Efforts are still underway to find additional ways to reduce the need for using the emery process on other products.

Manufacturing Process Controls

In 1996, Wilton Armetale entered into a Quality Assurance (QA) program sponsored by the Non-Ferrous Founders Society (NFFS) and funded by a grant from the Department of Defense. At that time, the company wanted to increase the consistency of its in-house process controls and become an ISO-certified supplier. Prior to implementing the QA program, Wilton Armetale frequently encountered four major problems:

- No set quality standards for finished products.
- Few documented procedures in use due to the changes that had occurred in the manufacturing process.
- No document control system in use.
- No creditable method of guaranteeing new customers that the company could consistently produce products to the same standard.

The initial action to achieve the program's goals involved the development of a quality control manual that would comply with the ISO-9002 Quality Assurance System. This manual needed to address the 19 elements that comprised the ISO standard as well as be supported by all departments within the company. After each draft, the departments performed internal audits and made corrections/revisions as needed. This process was repeated until the manual clearly and accurately described how Wilton Armetale's operations were performed, and how the company complied with the requirements of the ISO standard. In addition, input was obtained on the completed manual by those who would be using it (e.g., department supervisors, shop floor workers, QA personnel). This approach helped Wilton Armetale develop procedures that were technically sound and realistic to perform, and ensured that the procedures would more likely be followed and updated by those who helped develop them.

Since implementing the QA program, Wilton Armetale passed a third-party certification audit in December 1998 which resulted in a recommendation to the NFFS Review Board for certification. While the full potential of implementing this program has not been realized, the company is beginning to show some results in the areas of reduced scrap, customer returns, and rework.

Logistics

Training Program

Hiring qualified people and providing valuable training are mandatory practices in today's competitive market. Due to the unique product lines at Wilton Armetale, these practices become even more important. The company has always provided some form of training to its employees. However in 1998, Wilton Armetale changed to a more structured and disciplined training approach when it started a Job Consortium with four local companies. This consortium is partnered with the Lancaster County Career and Tech Center, and receives funding through the State of Pennsylvania for training costs if certain requirements are met. One requirement mandates that all training must be documented and reviewed by the State during quarterly audits. To help achieve this objective, Wilton Armetale reviewed and improved, as necessary, all training procedures in use at that time.

Since most of Wilton Armetale's training is performed on the job, it became necessary to automate and track individual employee training records by having the supervisors use a computer database. Computerized information is updated every month to ensure that it is current. Training at Wilton Armetale is conducted through the Human Resource Department, outside contractors, in-house supervisors, and/or trained team members. Surveys are one of the tools that the company uses to assess its workforce's training needs. Data is collected twice a year through department surveys, and a cross-functional team conducts an overall company survey once a year to track progress.

Wilton Armetale applied for ISO-9000 certification in 1998, and passed a third-party audit which resulted in a recommendation to the NFFS Review Board for certification. More than 200 Wilton Armetale employees received some version of training during 1998. The company is now using tools to track and predict training requirements before they become an issue. As a result, this approach is helping Wilton Armetale build a training program that will enable the company to maintain a highly trained workforce for the future.

Management

Business Strategic Planning

Wilton Armetale is currently reinventing its Business Strategic Planning process. Previously, the company developed elaborate plans which proved to be overwhelming and ineffective when put into effect. Although these plans projected objectives five years in advance, they were not very useful in practice. This type of planning was impractical, because the market and business environments would change so rapidly that the plans became outdated soon after they were written.

In 1999, Wilton Armetale simplified the Business Strategic Planning process so that it would be manageable and produce meaningful results. The Board Executive Committee identifies a few simple and clear-cut objectives to address, and the Operations Team develops a plan to meet those objectives. The objectives for 1999 are to increase sales by 10% and improve pre-tax profit on sales by 8%. The Operations Team also assigns core groups to work on the objectives.

By keeping the objectives simple and straightforward, Wilton Armetale can focus its efforts effectively; develop coordinated operational plans; and measure and track results. The company anticipates that its Business Strategic Planning process will simplify planning and make goals attainable.

Community Involvement

Wilton Armetale is an active participant in the Mount Joy community and always lends support when possible. The president approves all community involvement projects based on their beneficial impact to the community, the employees, and the company. Examples of Wilton Armetale's community involvement include:

- Donating products to be sold at community fundraisers for such projects as building the Mount Joy library and supporting the Mount Joy REACH (Renewal, Enhancement, and Advancement of the Community through its Heritage) program.
- Producing special medallions, plaques, and gifts for community events.
- Participating in community projects (e.g., Toys for Tots, Earth Day).
- Participating in Donegal School District programs (e.g., Trash to Cash).
- Working with local scout troops.
- Opening its doors for tours to educational, senior citizen, and organizational groups.
- Participating as a member on the REACH Committee and the Mount Joy Chamber of Commerce.

These programs provide many avenues for employees to become involved in the community. Through these efforts, Wilton Armetale shows its commitment to the local community and its interest in the area's growth and prosperity. As a result, community involvement has been an asset to all involved.

Ideas Suggestion Program

In 1994, Wilton Armetale set up the Ideas Suggestion program as part of its continuous improvement efforts. The program's purpose is to encourage employees to develop and implement ideas for improvement. At the start of the program, the company approved even small ideas as a way to encourage employees to participate and get into the habit of making changes. Possible suggestion topics include improving individual work processes; making the workplace and work safer; and creating savings in energy, materials, and resources.

To submit a suggestion, employees obtain an Ideas form from their supervisor or the lunch room, and complete the application per the form's instructions. The Ideas form is submitted to the supervisor who then discusses the idea with the employee. Based on this discussion, the idea is either approved or denied. If approved, the employee who submitted the idea follows through with its implementation. The final section of the Ideas form is filled out after the idea is implemented.

When an idea is submitted, the employee receives a lottery ticket. Photographs of the employee are also taken and displayed on company bulletin boards as well as in the company newsletter. After an idea is implemented, the employee receives $5. All ideas submitted for the month are reviewed and ranked by the Continuous Improvement Team. The highest ranked idea receives $100, the second highest receives $75, and the third highest receives $50. A random drawing of all ideas implemented during the month is then held. The winner receives a day off with pay.

Although all ideas were encouraged at the start of the Ideas Suggestion program, Wilton Armetale is now trying to place more emphasis on substantial, quantifiable ideas. In 1998, eight ideas were submitted through this program with an average savings of $1,482 per idea.

Safety Team

In 1994, Wilton Armetale created a Safety Team to oversee all aspects of safety and health within the company. The Safety Team is responsible for completing accident reports and accident investigation; identifying and correcting potential or existing hazards; maintaining safety records; providing Occupational Safety and Health Administration (OSHA) training; coordinating annual hearing testing; increasing the level of safety awareness; and ensuring an ethical and legal standard of safe operation. This 12-member team consists of employees from the foundry, distribution, and office staff. A four-week rotating cycle of meetings was developed to structure the team's activities.

- First Meeting — This is a formal organizational meeting whose agenda includes reviewing any new accidents; following up on individuals with restricted duty or lost time; and determining the status of current projects. A vital portion of this meeting is for the team to address concerns and potential hazards as well as recognize instances of safe behavior. The team also sets goals for project accomplishment and evaluates training needs.
- Second Meeting — This is an inspection of the facilities. Each team member uses a checklist to evaluate an assigned department. The checklists highlight hazards commonly targeted by OSHA

inspectors (e.g., personal protective equipment, tripping hazards, and Material Safety Data Sheet compliance). Team members also identify any potential or existing hazards during their inspections. The results of the inspection are communicated to the department supervisors. Any potential or existing hazards that can be immediately eliminated are handled on the spot. Inspection assignments are also rotated quarterly to provide a fresh look at each area.

- Third Meeting — This is a work-detail activity for correcting the violations noted on the inspection forms. One team member is responsible for reviewing the inspection results and preparing all necessary materials and resources to correct outstanding concerns. All members participate in the activities such as painting yellow hazard lines, tightening handrails, and posting updated personal protective equipment signs. For tasks that are outside of the capabilities of the team (e.g., installing panic door hardware on an exit door), a work order is initiated for the maintenance department. A team member is then assigned to do a follow-up which ensures that the work was completed.

- Fourth Meeting — This meeting is designated for training sessions and presentations. Typical meetings include reviewing informational videos and magazines to learn about the latest developments in safety and health; providing training on cardiopulmonary resuscitation certification; and offering refresher courses in first aid methods. Some meetings focus on reviewing OSHA regulations, or the team may develop department specific safety training in addition to annual OSHA training. Other meetings feature guest speakers including individuals from the company's panel of doctors, the Workers' Compensation carrier, other foundries, and local suppliers.

When an accident occurs, a team member fills out an accident report and notifies the employee's supervisor about the incident as well as any doctor's appointments, if necessary. Another team member is assigned the responsibility of investigating the accident and interviewing the injured employee and any witnesses. The information is communicated to the supervisor and the rest of the Safety Team. The team determines the root cause of the accident, and the appropriate corrective action is taken. The injured employee is assigned a buddy from the Safety Team to assist in case management. Emotional support is also provided to the injured employee. Follow-ups are done to determine the employee's needs in the workplace. The Safety Team is effective in addressing safety issues, helping to maintain a safe workplace, and maintaining a focus on safety in the workplace.

Appendix A

Table of Acronyms

Acronym	Definition
EDI	Electronic Data Interchange
NFFS	Non-Ferrous Founders Society
OSHA	Occupational Safety and Health Administration
QA	Quality Assurance
REACH	Renewal, Enhancement, and Advancement of the Community through its Heritage

A p p e n d i x B
BMP Survey Team

Team Member	Activity	Function
Larry Robertson (812) 854-5336	**Crane Division** **Naval Surface Warfare Center** Crane, IN	**Team Chairman**
Cheri Spencer (301) 403-8100	**BMP Center of Excellence** College Park, MD	**Technical Writer**

Technical Team

Larry Robertson (812) 854-5336	**Naval Surface Warfare Center** Crane, IN	**Team Leader**
Jack Tamargo (707) 642-4267	**BMP Satellite Center** Vallejo, CA	

Management Team

|		
Rick Purcell (301) 403-8100	**BMP Center of Excellence** College Park, MD	**Team Leader**
Larry Halbig (317) 891-9901	**BMP Field Office** Indianapolis, IN	

Appendix C
Critical Path Templates and BMP Templates

This survey was structured around and concentrated on the functional areas of design, test, production, facilities, logistics, and management as presented in the Department of Defense 4245.7-M, *Transition from Development to Production* document. This publication defines the proper tools—or templates—that constitute the critical path for a successful material acquisition program. It describes techniques for improving the acquisition process by addressing it as an *industrial* process that focuses on the product's design, test, and production phases which are interrelated and interdependent disciplines.

The BMP program has continued to build on this knowledge base by developing 17 new templates that complement the existing DOD 4245.7-M templates. These BMP templates address new or emerging technologies and processes.

"CRITICAL PATH TEMPLATES FOR TRANSITION FROM DEVELOPMENT TO PRODUCTION"
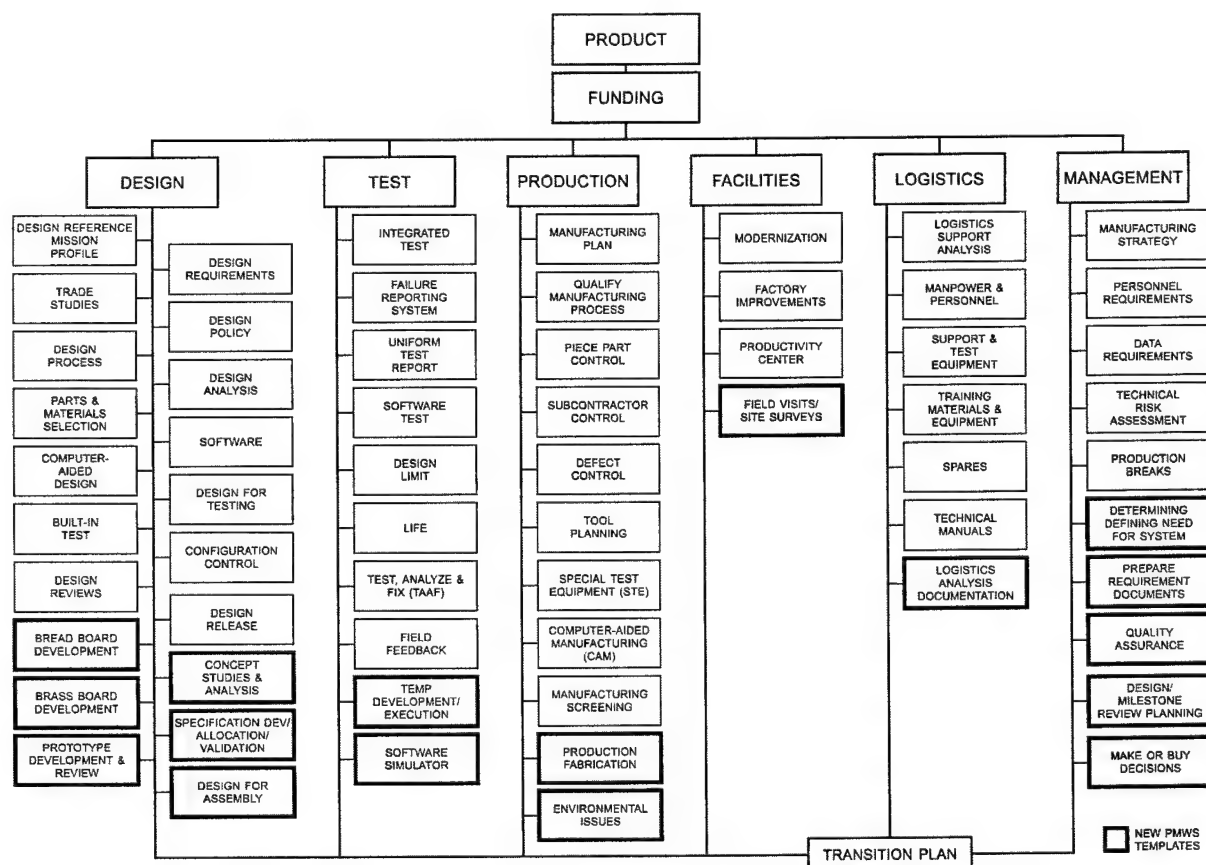
Appendix D

BMPnet and the Program Manager's WorkStation

The BMPnet, located at the Best Manufacturing Practices Center of Excellence (BMPCOE) in College Park, Maryland, supports several communication features. These features include the Program Manager's WorkStation (**PMWS**), electronic mail and file transfer capabilities, as well as access to Special Interest Groups (SIGs) for specific topic information and communication. The BMPnet can be accessed through the World Wide Web (at http://www.bmpcoe.org), through free software that connects directly over the Internet or through a modem. The PMWS software is also available on CD-ROM.

PMWS provides users with timely acquisition and engineering information through a series of interrelated software environments and knowledge-based packages. The main components of PMWS are KnowHow, SpecRite, the Technical Risk Identification and Mitigation System (TRIMS), and the BMP Database.

KnowHow is an intelligent, automated program that provides rapid access to information through an intelligent search capability. Information currently available in KnowHow handbooks includes Acquisition Streamlining, Non-Development Items, Value Engineering, NAVSO P-6071 (Best Practices Manual), MIL-STD-2167/2168 and the DoD 5000 series documents. KnowHow cuts document search time by 95%, providing critical, user-specific information in under three minutes.

SpecRite is a performance specification generator based on expert knowledge from all uniformed services. This program guides acquisition personnel in creating specifications for their requirements, and is structured for the build/approval process. SpecRite's knowledge-based guidance and assistance structure is modular, flexible, and provides output in MIL-STD 961D format in the form of editable WordPerfect® files.

TRIMS, based on DoD 4245.7-M (the transition templates), NAVSO P-6071, and DoD 5000 event-oriented acquisition, helps the user identify and rank a program's high-risk areas. By helping the user conduct a full range of risk assessments throughout the acquisition process, TRIMS highlights areas where corrective action can be initiated before risks develop into problems. It also helps users track key project documentation from concept through production including goals, responsible personnel, and next action dates for future activities.

The **BMP Database** contains proven best practices from industry, government, and the academic communities. These best practices are in the areas of design, test, production, facilities, management, and logistics. Each practice has been observed, verified, and documented by a team of government experts during BMP surveys.

Access to the BMPnet through dial-in or on Internet requires a special modem program. This program can be obtained by calling the BMPnet Help Desk at (301) 403-8179 or it can be downloaded from the World Wide Web at http://www.bmpcoe.org. To receive a user/e-mail account on the BMPnet, send a request to helpdesk@bmpcoe.org.
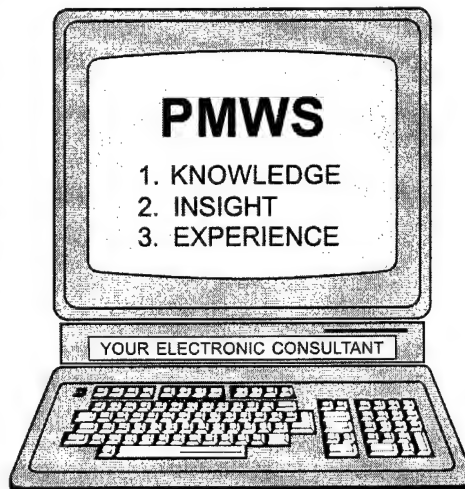
Appendix E

Best Manufacturing Practices Satellite Centers

There are currently ten Best Manufacturing Practices (BMP) satellite centers that provide representation for and awareness of the BMP program to regional industry, government and academic institutions. The centers also promote the use of BMP with regional Manufacturing Technology Centers. Regional manufacturers can take advantage of the BMP satellite centers to help resolve problems, as the centers host informative, one-day regional workshops that focus on specific technical issues.

Center representatives also conduct BMP lectures at regional colleges and universities; maintain lists of experts who are potential survey team members; provide team member training; and train regional personnel in the use of BMP resources such as the BMPnet.

The ten BMP satellite centers include:

California

Chris Matzke
BMP Satellite Center Manager
Naval Warfare Assessment Division
Code QA-21, P.O. Box 5000
Corona, CA 91718-5000
(909) 273-4992
FAX: (909) 273-4123
cmatzke@bmpcoe.org

Jack Tamargo
BMP Satellite Center Manager
257 Cottonwood Drive
Vallejo, CA 94591
(707) 642-4267
FAX: (707) 642-4267
jtamargo@bmpcoe.org

District of Columbia

Chris Weller
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FAX: (202) 482-5650
cweller@bxa.doc.gov

Illinois

Thomas Clark
BMP Satellite Center Manager
Rock Valley College
3301 North Mulford Road
Rockford, IL 61114
(815) 654-5515
FAX: (815) 654-4459
adme3tc@rvcux1.rvc.cc.il.us

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Program Manager
Iowa Procurement Outreach Center
200 East Grand Avenue
Des Moines, IA 50309
(515) 242-4888
FAX: (515) 242-4893
bruce.coney@ided.state.ia.us

Louisiana

Dr. Kenneth L. McManis
Director
Maritime Environmental Resources & Information
   Center
Gulf Coast Region Maritime Technology Center
University of New Orleans
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(504) 280-6271
FAX: (504) 280-5586
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M/S 8091
Oak Ridge, TN 37831-8091
(423) 576-5532
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tgraham@bmpcoe.org

Appendix F

Navy Manufacturing Technology Centers of Excellence

The Navy Manufacturing Sciences and Technology Program established the following Centers of Excellence (COEs) to provide focal points for the development and technology transfer of new manufacturing processes and equipment in a cooperative environment with industry, academia, and Navy centers and laboratories. These COEs are consortium-structured for industry, academia, and government involvement in developing and implementing technologies. Each COE has a designated point of contact listed below with the individual COE information.

Best Manufacturing Practices Center of Excellence

The Best Manufacturing Practices Center of Excellence (BMPCOE) provides a national resource to identify and promote exemplary manufacturing and business practices and to disseminate this information to the U.S. Industrial Base. The BMPCOE was established by the Navy's BMP program, Department of Commerce's National Institute of Standards and Technology, and the University of Maryland at College Park, Maryland. The BMPCOE improves the use of existing technology, promotes the introduction of improved technologies, and provides non-competitive means to address common problems, and has become a significant factor in countering foreign competition.

Point of Contact:
Mr. Ernie Renner
Best Manufacturing Practices Center of
Excellence
4321 Hartwick Road
Suite 400
College Park, MD 20740
(301) 403-8100
FAX: (301) 403-8180
ernie@bmpcoe.org

Center of Excellence for Composites Manufacturing Technology

The Center of Excellence for Composites Manufacturing Technology (CECMT) provides a national resource for the development and dissemination of composites manufacturing technology to defense contractors and subcontractors. The CECMT is managed by the Great Lakes Composites Consortium and represents a collaborative effort among industry, academia, and government to develop, evaluate, demonstrate, and test composites manufacturing technologies. The technical work is problem-driven to reflect current and future Navy needs in the composites industrial community.

Point of Contact:
Mr. James Ray
Center of Excellence for Composites Manufacturing
Technology
c/o GLCC, Inc.
103 Trade Zone Drive
Suite 26C
West Columbia, SC 29170
(803) 822-3708
FAX: (803) 822-3710
jrglcc@glcc.org

Electronics Manufacturing Productivity Facility

The Electronics Manufacturing Productivity Facility (EMPF) identifies, develops, and transfers innovative electronics manufacturing processes to domestic firms in support of the manufacture of affordable military systems. The EMPF operates as a consortium comprised of industry, university, and government participants, led by the American Competitiveness Institute under a CRADA with the Navy.

Point of Contact:
Mr. Alan Criswell
Electronics Manufacturing Productivity Facility
One International Plaza
Suite 600
Philadelphia, PA 19113
(610) 362-1200
FAX: (610) 362-1290
criswell@aci-corp.org

National Center for Excellence in Metalworking Technology

The National Center for Excellence in Metalworking Technology (NCEMT) provides a national center for the development, dissemination, and implementation of advanced technologies for metalworking products and processes. The NCEMT, operated by Concurrent Technologies Corporation, helps the

Navy and defense contractors improve manufacturing productivity and part reliability through development, deployment, training, and education for advanced metalworking technologies.

Point of Contact:
Mr. Richard Henry
National Center for Excellence in Metalworking
Technology
c/o Concurrent Technologies Corporation
100 CTC Drive
Johnstown, PA 15904-3374
(814) 269-2532
FAX: (814) 269-2501
henry@ctc.com

Navy Joining Center

The Navy Joining Center (NJC) is operated by the Edison Welding Institute and provides a national resource for the development of materials joining expertise and the deployment of emerging manufacturing technologies to Navy contractors, subcontractors, and other activities. The NJC works with the Navy to determine and evaluate joining technology requirements and conduct technology development and deployment projects to address these issues.

Point of Contact:
Mr. David P. Edmonds
Navy Joining Center
1250 Arthur E. Adams Drive
Columbus, OH 43221-3585
(614) 688-5096
FAX: (614) 688-5001
dave_edmonds@ewi.org

Energetics Manufacturing Technology Center

The Energetics Manufacturing Technology Center (EMTC) addresses unique manufacturing processes and problems of the energetics industrial base to ensure the availability of affordable, quality, and safe energetics. The focus of the EMTC is on process technology with a goal of reducing manufacturing costs while improving product quality and reliability. The EMTC also maintains a goal of development and implementation of environmentally benign energetics manufacturing processes.

Point of Contact:
Mr. John Brough
Energetics Manufacturing Technology Center
Indian Head Division
Naval Surface Warfare Center
101 Strauss Avenue
Building D326, Room 227
Indian Head, MD 20640-5035
(301) 744-4417
DSN: 354-4417
FAX: (301) 744-4187
mt@command.ih.navy.mil

Institute for Manufacturing and Sustainment Technologies

The Institute for Manufacturing and Sustainment Technologies (iMAST), was formerly known as Manufacturing Science and Advanced Materials Processing Institute. Located at the Pennsylvania State University's Applied Research Labortory, the primary objective of iMAST is to address challenges relative to Navy and Marine Corps weapon system platforms in the areas of mechnical drive transmission techologies, materials science technologies, high energy processing technologies, and repair technology.

Point of Contact:
Mr. Henry Watson
Institute for Manufacturing and Sustainment
Technologies
ARL Penn State
P.O. Box 30
State College, PA 16804-0030
(814) 865-6345
FAX: (814) 863-1183
hew2@psu.edu

National Network for Electro-Optics Manufacturing Technology

The National Netowork for Electro-Optics Manufacturing Technology (NNEOMT), a low overhead virtual organization, is a national consortium of electro-optics industrial companies, universities, and government research centers that share their electro-optics expertise and capabilities through project teams focused on Navy requirements. NNEOMT is managed by the Ben Franklin Technology Center of Western Pennsylvania.

Point of Contact:
Dr. Raymond V. Wick
National Network for Electro-Optics Manufacturing Technology
One Parks Bend
Box 24, Suite 206
Vandergrift, PA 15690
(724) 845-1138
FAX: (724) 845-2448
wick@nneomt.org

Gulf Coast Region Maritime Technology Center

The Gulf Coast Region Maritime Technology Center (GCRMTC) is located at the University of New Orleans and focuses primarily on product developments in support of the U.S. shipbuilding industry. A sister site at Lamar University in Orange, Texas focuses on process improvements.

Point of Contact:
Dr. John Crisp, P.E.
Gulf Coast Region Maritime Technology Center
University of New Orleans
College of Engineering
Room EN-212
New Orleans, LA 70148
(504) 280-5586
FAX: (504) 280-3898
jncme@uno.edu

Manufacturing Technology Transfer Center

The focus of the Manufacturing Technology Transfer Center (MTTC) is to implement and integrate defense and commercial technologies and develop a technical assistance network to support the Dual Use Applications Program. MTTC is operated by Innovative Productivity, Inc., in partnership with industry, government, and academia.

Point of Contact:
Mr. Raymond Zavada
Manufacturing Technology Transfer Center
119 Rochester Drive
Louisville, KY 40214-2684
(502) 452-1131
FAX: (502) 451-9665
rzavada@mttc.org

Appendix G

Completed Surveys

As of this publication, 112 surveys have been conducted and published by BMP at the companies listed below. Copies of older survey reports may be obtained through DTIC or by accessing the BMPnet. Requests for copies of recent survey reports or inquiries regarding the BMPnet may be directed to:

Best Manufacturing Practices Program
4321 Hartwick Rd., Suite 400
College Park, MD 20740
Attn: Mr. Ernie Renner, Director
Telephone: 1-800-789-4267
FAX: (301) 403-8180
ernie@bmpcoe.org

1985	Litton Guidance & Control Systems Division - Woodland Hills, CA
1986	Honeywell, Incorporated Undersea Systems Division - Hopkins, MN (Alliant TechSystems, Inc.)
	Texas Instruments Defense Systems & Electronics Group - Lewisville, TX
	General Dynamics Pomona Division - Pomona, CA
	Harris Corporation Government Support Systems Division - Syosset, NY
	IBM Corporation Federal Systems Division - Owego, NY
	Control Data Corporation Government Systems Division - Minneapolis, MN
1987	Hughes Aircraft Company Radar Systems Group - Los Angeles, CA
	ITT Avionics Division - Clifton, NJ
	Rockwell International Corporation Collins Defense Communications - Cedar Rapids, IA
	UNISYS Computer Systems Division - St. Paul, MN (Paramax)
1988	Motorola Government Electronics Group - Scottsdale, AZ
	General Dynamics Fort Worth Division - Fort Worth, TX
	Texas Instruments Defense Systems & Electronics Group - Dallas, TX
	Hughes Aircraft Company Missile Systems Group - Tucson, AZ
	Bell Helicopter Textron, Inc. - Fort Worth, TX
	Litton Data Systems Division - Van Nuys, CA
	GTE C³ Systems Sector - Needham Heights, MA
1989	McDonnell-Douglas Corporation McDonnell Aircraft Company - St. Louis, MO
	Northrop Corporation Aircraft Division - Hawthorne, CA
	Litton Applied Technology Division - San Jose, CA
	Litton Amecom Division - College Park, MD
	Standard Industries - LaMirada, CA
	Engineered Circuit Research, Incorporated - Milpitas, CA
	Teledyne Industries Incorporated Electronics Division - Newbury Park, CA
	Lockheed Aeronautical Systems Company - Marietta, GA
	Lockheed Corporation Missile Systems Division - Sunnyvale, CA
	Westinghouse Electronic Systems Group - Baltimore, MD
	General Electric Naval & Drive Turbine Systems - Fitchburg, MA
	Rockwell International Corporation Autonetics Electronics Systems - Anaheim, CA
	TRICOR Systems, Incorporated - Elgin, IL
1990	Hughes Aircraft Company Ground Systems Group - Fullerton, CA
	TRW Military Electronics and Avionics Division - San Diego, CA
	MechTronics of Arizona, Inc. - Phoenix, AZ
	Boeing Aerospace & Electronics - Corinth, TX
	Technology Matrix Consortium - Traverse City, MI
	Textron Lycoming - Stratford, CT

1991	*Resurvey of Litton Guidance & Control Systems Division* - Woodland Hills, CA
	Norden Systems, Inc. - Norwalk, CT
	Naval Avionics Center - Indianapolis, IN
	United Electric Controls - Watertown, MA
	Kurt Manufacturing Co. - Minneapolis, MN
	MagneTek Defense Systems - Anaheim, CA
	Raytheon Missile Systems Division - Andover, MA
	AT&T Federal Systems Advanced Technologies and AT&T Bell Laboratories - Greensboro, NC and Whippany, NJ
	Resurvey of Texas Instruments Defense Systems & Electronics Group - Lewisville, TX

1992	Tandem Computers - Cupertino, CA
	Charleston Naval Shipyard - Charleston, SC
	Conax Florida Corporation - St. Petersburg, FL
	Texas Instruments Semiconductor Group Military Products - Midland, TX
	Hewlett-Packard Palo Alto Fabrication Center - Palo Alto, CA
	Watervliet U.S. Army Arsenal - Watervliet, NY
	Digital Equipment Company Enclosures Business - Westfield, MA and Maynard, MA
	Computing Devices International - Minneapolis, MN
	(Resurvey of Control Data Corporation Government Systems Division)
	Naval Aviation Depot Naval Air Station - Pensacola, FL

1993	NASA Marshall Space Flight Center - Huntsville, AL
	Naval Aviation Depot Naval Air Station - Jacksonville, FL
	Department of Energy Oak Ridge Facilities (Operated by Martin Marietta Energy Systems, Inc.) - Oak Ridge, TN
	McDonnell Douglas Aerospace - Huntington Beach, CA
	Crane Division Naval Surface Warfare Center - Crane, IN and Louisville, KY
	Philadelphia Naval Shipyard - Philadelphia, PA
	R. J. Reynolds Tobacco Company - Winston-Salem, NC
	Crystal Gateway Marriott Hotel - Arlington, VA
	Hamilton Standard Electronic Manufacturing Facility - Farmington, CT
	Alpha Industries, Inc. - Methuen, MA

1994	Harris Semiconductor - Melbourne, FL
	United Defense, L.P. Ground Systems Division - San Jose, CA
	Naval Undersea Warfare Center Division Keyport - Keyport, WA
	Mason & Hanger - Silas Mason Co., Inc. - Middletown, IA
	Kaiser Electronics - San Jose, CA
	U.S. Army Combat Systems Test Activity - Aberdeen, MD
	Stafford County Public Schools - Stafford County, VA

1995	Sandia National Laboratories - Albuquerque, NM
	Rockwell Defense Electronics Collins Avionics & Communications Division - Cedar Rapids, IA
	(Resurvey of Rockwell International Corporation Collins Defense Communications)
	Lockheed Martin Electronics & Missiles - Orlando, FL
	McDonnell Douglas Aerospace (St. Louis) - St. Louis, MO
	(Resurvey of McDonnell-Douglas Corporation McDonnell Aircraft Company)
	Dayton Parts, Inc. - Harrisburg, PA
	Wainwright Industries - St. Peters, MO
	Lockheed Martin Tactical Aircraft Systems - Fort Worth, TX
	(Resurvey of General Dynamics Fort Worth Division)
	Lockheed Martin Government Electronic Systems - Moorestown, NJ
	Sacramento Manufacturing and Services Division - Sacramento, CA
	JLG Industries, Inc. - McConnellsburg, PA

1996	City of Chattanooga - Chattanooga, TN
	Mason & Hanger Corporation - Pantex Plant - Amarillo, TX
	Nascote Industries, Inc. - Nashville, IL
	Weirton Steel Corporation - Weirton, WV
	NASA Kennedy Space Center - Cape Canaveral, FL
	Department of Energy, Oak Ridge Operations - Oak Ridge, TN

1997	Headquarters, U.S. Army Industrial Operations Command - Rock Island, IL
	SAE International and Performance Review Institute - Warrendale, PA
	Polaroid Corporation - Waltham, MA
	Cincinnati Milacron, Inc. - Cincinnati, OH
	Lawrence Livermore National Laboratory - Livermore, CA
	Sharretts Plating Company, Inc. - Emigsville, PA
	Thermacore, Inc. - Lancaster, PA
	Rock Island Arsenal - Rock Island, IL
	Northrop Grumman Corporation - El Segundo, CA
	(Resurvey of Northrop Corporation Aircraft Division)
	Letterkenny Army Depot - Chambersburg, PA
	Elizabethtown College - Elizabethtown, PA
	Tooele Army Depot - Tooele, UT
1998	United Electric Controls - Watertown, MA
	Strite Industries Limited - Cambridge, Ontario, Canada
	Northrop Grumman Corporation - El Segundo, CA
	Corpus Christi Army Depot - Corpus Christi, TX
	Anniston Army Depot - Anniston, AL
	Naval Air Warfare Center, Lakehurst - Lakehurst, NJ
	Sierra Army Depot - Herlong, CA
	ITT Industries Aerospace/Communications Division - Fort Wayne, IN
	Raytheon Missile Systems Company - Tucson, AZ
	Naval Aviation Depot North Island - San Diego, CA
	U.S.S. Carl Vinson (CVN-70) - Commander Naval Air Force, U.S. Pacific Fleet
1999	Wilton Armetale - Mount Joy, PA

INTERNET DOCUMENT INFORMATION FORM

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B. DATE Report Downloaded From the Internet: 01/14/02

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